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Practitioner's Docket No. 64539-0215

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Box Patent Application
Assistant Commissioner for Patents
Washington, D.C. 20231



NEW APPLICATION TRANSMITTAL

Transmitted herewith for filing is the patent application of

Inventor(s): Eugene B. Porter, Werner Saussele, Frank Lombardo, Christopher Jones, Bernd Walther

For (title): IMPROVED MOTOR BRUSH HOLDER AND ALIGNMENT ASSEMBLY

1. Type of Application

This transmittal is for an original (nonprovisional) application.

2. Papers Enclosed

A. Required for filing date under 37 C.F.R. 1.53(b) (Regular) or 37 C.F.R. 1.153 (Design) Application

7 Page(s) of Specification

CERTIFICATION UNDER 37 C.F.R. 1.10*

(Express Mail label number is **mandatory**.)

(Express Mail certification is optional.)

I hereby certify that this correspondence and the documents referred to as attached therein are being deposited with the United States Postal Service on this date July 31, 2000, in an envelope as "Express Mail Post Office to Addressee," mailing Label Number EL489897931US, addressed to the: Assistant Commissioner for Patents, Washington, D.C. 20231.

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WARNING: Certificate of mailing (first class) or facsimile transmission procedures of 37 C.F.R. 1.8 cannot be used to obtain a date of mailing or transmission for this correspondence.

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"Since the filing of correspondence under § 1.10 without the Express Mail mailing label thereon is an oversight that can be avoided by the exercise of reasonable care, requests for waiver of this requirement will **not** be granted on petition." Notice of Oct 24, 1996, 60 Fed. Reg. 56,439, at 56,442.

- 2 Page(s) of Claims
3 Sheet(s) of Drawing(s)-Informal

B. Other Papers Enclosed

- 1 Page(s) of abstract

3. Declaration or Oath

Not Enclosed.

Application is made by a person authorized under 37 C.F.R. 1.41(c) on behalf of all of the above-named inventors.

4. Inventorship Statement

The inventorship for all the claims in this application is the same.

5. Language

English

6. Fee Calculation (37 C.F.R. 1.16)

Regular Application

CLAIMS AS FILED					
Claims	Number Filed	Basic Fee Allowance	Number Extra	Rate	Basic Fee 37 CFR 1.16(a) \$690.00
Total Claims (37 CFR 1.16(c))	7	- 20 =	0 x	\$18.00	\$0.00
Independent Claims (37 CFR 1.16(b))	2	- 3 =	0 x	\$78.00	\$0.00
Multiple Dependent Claim(s), if any (37 CFR 1.16(d))			+	\$260.00	\$0.00

Filing Fee Calculation

\$690.00

7. Fee Payment Being Made at This Time

Enclosed

Filing Fee

\$690.00

Total Fees Enclosed

\$690.00

8. Method of Payment of Fees

Charge Account No. 18-0013 in the amount of \$690.00.
A duplicate of this transmittal is attached.

9. Authorization to Charge Additional Fees

The Commissioner is hereby authorized to charge the following additional fees by this paper and during the entire pendency of this application to Account No. 18-0013.

☒ 37 C.F.R. 1.16(a), (f) or (g) (filing fees)

☐ 37 C.F.R. 1.16(b), (c) or (d) (presentation of extra claims)

☐ 37 C.F.R. 1.16(e) (surcharge for filing the basic filing fee and/or declaration on a date later than the filing date of the application)

☐ 37 C.F.R. 1.17(a)(1)-(5) (extension fees pursuant to § 1.136(a))

☐ 37 C.F.R. 1.17 (application processing fees)

10. Instructions as to Overpayment

Credit Account No. 18-0013.

Reg. No. 33,373
Tel. No.: (248) 594-0650

Customer No.: 010291


SIGNATURE OF PRACTITIONER

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IMPROVED MOTOR BRUSH HOLDER AND ALIGNMENT ASSEMBLY

TECHNICAL FIELD

5 The present invention is directed to a motor assembly, and more particularly to an assembly that aligns the brushes with the magnets and commutator in the motor.

BACKGROUND ART

10 Consistent, reliable motor performance depends on proper alignment between the brushes, the commutator, and the magnets in the motor. In a conventional motor structure, the brushes are located in a brush housing and the commutator and magnets are located in a motor housing.

15 The two housings are joined together to form the motor assembly. To align and join the two housings, a known motor housing structure may include flats that engage with ribs formed on the brush housing to align the motor assembly. A variation of the above-described conventional

20 structure includes peg-like structures in the brush housing that frictionally engage with holes drilled in flanges extending outwardly from the motor housing.

Prior art motor assemblies, however, depended on following precise tolerances in the positioning of the magnets and commutator within the motor housing with respect to the flanges on the outside of the motor housing.

5 Because the magnet position within the motor housing, the flange position, the brush position, and the fit tolerances are all independently variable with respect to each other, obtaining consistent alignment of the brushes with both the commutator and the magnets can be difficult because the
10 magnets must first be positioned precisely in the motor housing with respect to the flanges, and the tolerances of the flanges must be precise enough to ensure that the brushes are correctly aligned with the magnets and commutator. These variables tend to cause performance
15 variations as well as added complexity in the manufacturing process.

There is a need for a motor housing assembly that improves the alignment of the brushes to the magnets and the commutator and minimize performance variations from
20 motor to motor.

SUMMARY OF THE INVENTION

Accordingly, the present invention is directed to a motor housing assembly that includes a motor housing, a pair of magnets disposed within the motor housing in a spaced relationship to form at least one space, and a brush holder having at least one tab that fits within said at least one space in between the pair of magnets. One preferred embodiment positions the magnets within the housing to form two spaces lying opposite each other. The brush housing in this embodiment has two tabs that extend into the two spaces formed by the magnet pair.

Because the present invention aligns the brushes based on the magnet position and not on physical attributes of the motor housing, such as external flanges, the inventive structure prevents the brush position from being completely independent of the magnet position, as in prior art devices. Instead, the inventive structure aligns the brushes based on the magnet position, thereby ensuring a consistent positional relationship between the magnet and the brushes from device to device.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is an exploded view of a motor housing assembly of the present invention;

Figure 2 is an isometric view of the motor housing interior in the present invention; and

Figure 3 is a sectional view of the motor housing assembly of the present invention after the motor housing and brush holder shown in Figures 2 and 3 are assembled together.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Figure 1 is an exploded view of the motor housing assembly 100 of the present invention, and Figure 2 is an isometric view of a motor housing used in the assembly 100.

The assembly 100 includes a motor housing 102 that holds a pair of magnets 104, 106. The magnets 104, 106 are preferably attached to the motor housing 102 in a spaced relationship to form two spaces 108, 110 that are disposed opposite each other, as can be seen more clearly in Figure 2. These spaces 108, 110 will be used for aligning brushes with the magnets 104, 106, which be explained in greater detail below. Because the inventive assembly 100 does not rely upon engagement of any portion of the motor housing

102 for brush alignment, the motor housing 102 does not require the magnets 104, 106 to be positioned precisely with respect to any flanges or any other portion of the motor housing 102.

5 The assembly also includes a brush holder 112 that holds several brushes (not shown) and has a pair of tabs 118, 120 extending from the main body portion 116. The spacing and position of the tabs 118, 120 correspond with the position of the spaces 108, 110 between the magnets in
10 the motor housing 102 so that the tabs 118, 120 extend into the motor housing 102 via the spaces 108, 110, as can be seen in Figure 3, when the motor housing 102 and the brush holder 112 are assembled together. Preferably, the tabs 118, 120 fit within the spaces 108, 110 in a sliding
15 manner. The brush holder 112 can be made of any material conventionally used to construct brush holders. Further, because the brush holder 112 does not need to engage with any portion of the motor housing 102 in a frictional or interference fit, the tabs 118, 120 do not need to conform
20 to extremely close tolerances.

Referring to Figures 1 and 3, the motor housing 102 and brush holder 112 are assembled together with a commutator 122 and an armature shaft 124, like conventional

motor assembly structures. As can be seen from the Figures, the tabs 118, 120 extend into the spaces 108, 110 formed by the magnets 104, 106 to align the brushes (not shown) in the brush holder 112 with the magnets 104, 106 and the commutator 122. After assembly, the tabs 118, 120 lie on either side of the commutator 122. Because the orientation of the brush holder 112, and therefore the brushes (not shown), depends on the magnet position, the brushes (not shown) will consistently be aligned properly with the magnets 104, 106 regardless of the motor housing's external dimensions and regardless of the magnets' 104, 106 orientation within the housing. More particularly, the magnet/brush alignment in the inventive structure does not depend on aligning the magnets 104, 106 with flanges on the motor housing, nor does it require any frictional engagement or an interference fit between any portion of the motor housing 102 and the brush holder 112.

The inventive structure therefore uses the operational parts of the motor (e.g. the magnets) to align other operational parts of the motor (e.g. the brushes). This structure eliminates the need to position the magnets precisely within the motor housing with respect to flanges or other structures formed on the housing, preventing the

brush position from being independent of the magnet position and improving the alignment of the brushes to the magnets and to the commutator.

It should be understood that various alternatives to
5 the embodiments of the invention described herein may be employed in practicing the invention. It is intended that the following claims define the scope of the invention and that the method and apparatus within the scope of these claims and their equivalents be covered thereby.

CLAIMS

WHAT IS CLAIMED IS:

1. A motor housing assembly, comprising:
5 a motor housing;
a pair of magnets disposed within the motor housing in
a spaced relationship to form at least one space;
a brush holder having at least one tab that fits
within said at least one space in between the pair of
10 magnets.

2. The motor housing assembly of claim 1, wherein
the pair of magnets form two spaces and the brush holder
has two tabs to fit in the two spaces.

3. The motor housing assembly of claim 2, wherein
the two spaces are disposed opposite each other and the two
tabs on the brush holder are also disposed opposite each
other.

4. The motor housing assembly of claim 2, wherein
the pair of magnets are attached to an inner surface of the
motor housing.

5. A motor housing assembly, comprising:

a motor housing;

a pair of magnets attached to an inner surface of the
5 motor housing in a spaced relationship to form two spaces
that lie generally opposite each other;

an armature disposed in between the pair of magnets;

and

a brush holder having a plurality of brushes and two
10 tabs that fit within the two spaces formed by the pair of
magnets to align the plurality of brushes with the magnets.

6. The motor housing assembly of claim 5, wherein
the tabs fit within the two spaces in a sliding engagement.

15

7. The motor housing of claim 5, wherein the pair of
magnets and the tabs surround the circumference of the
armature after the motor housing and the brush holder are
assembled together.

ABSTRACT

A motor housing assembly includes a motor housing with two magnets disposed in the housing in a spaced relationship and a brush holder that couples with the motor housing. The magnets are disposed inside the motor housing to form two spaces in between the magnets. The brush holder has two tabs that extend inside the motor housing in between the two spaces. The tabs allow the brushes in the brush holder to be aligned solely based on the magnet position to ensure that there is proper angular alignment between the brushes and the magnets.

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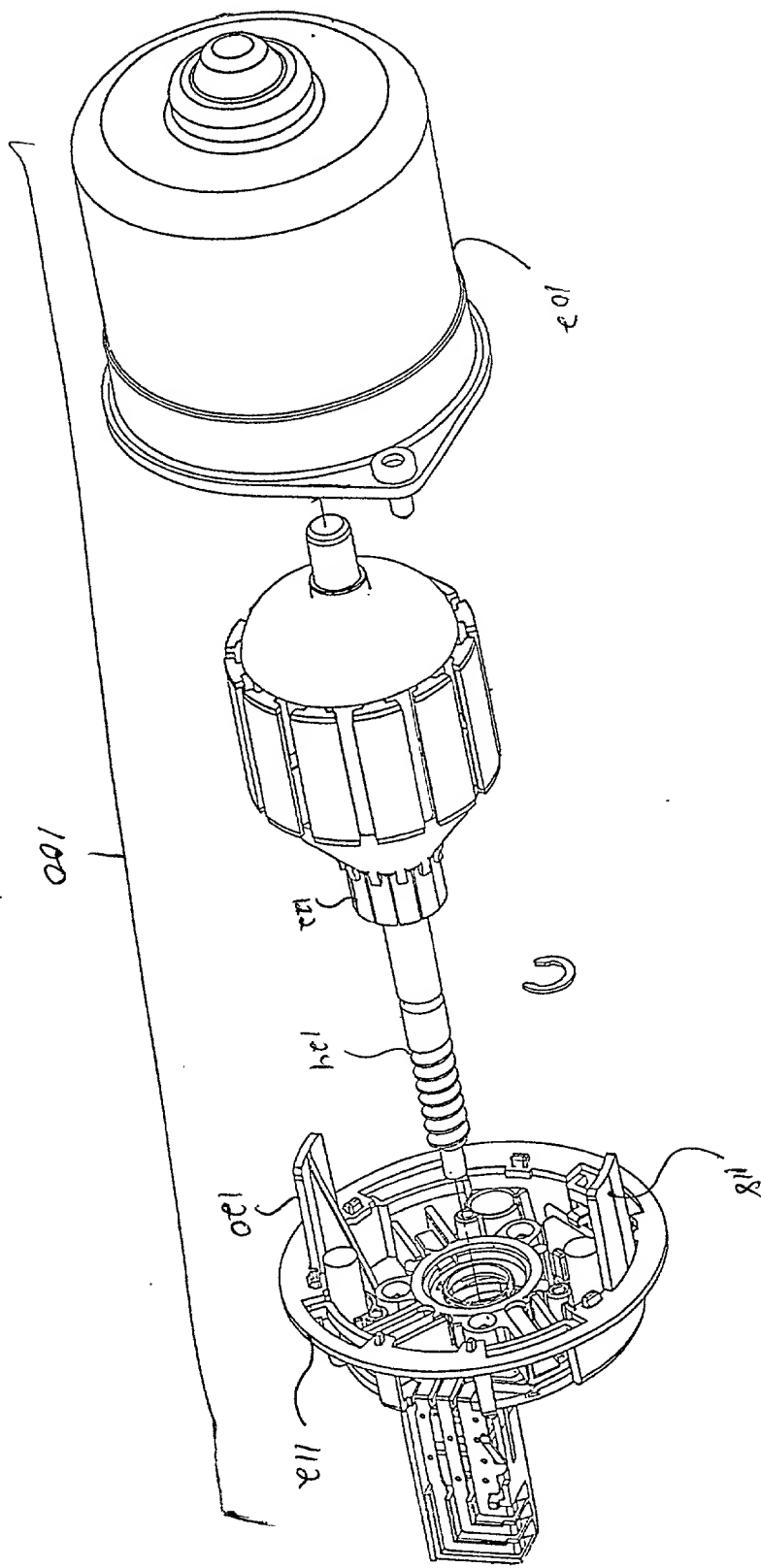


FIG. 1

FIG. 1 is a perspective view of a mechanical assembly in an exploded state. The assembly includes a shaft (100), a top housing (102), a ribbed component (112), a base housing (118), and several smaller components (120, 122, 124, 126) that are shown in their relative positions to the main assembly.

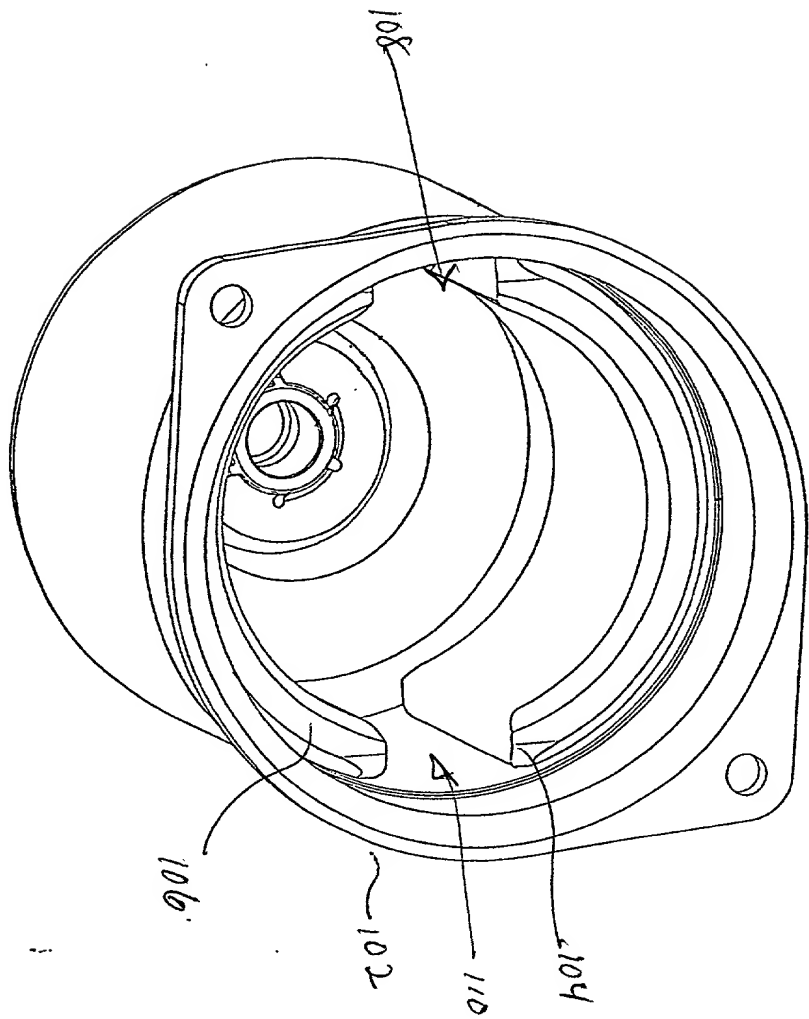


FIG. 2

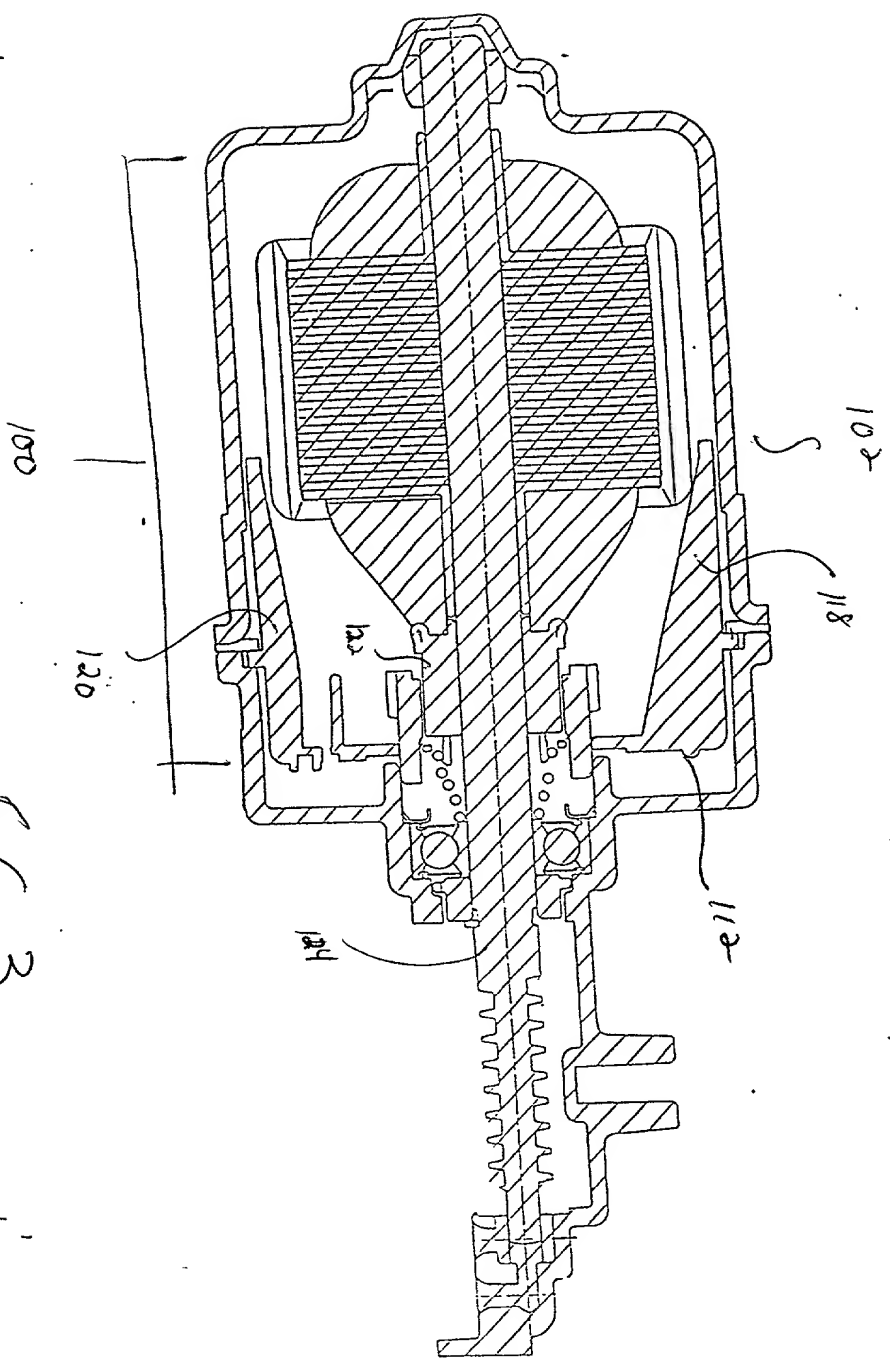


FIG. 3

FIG. 3 is a cross-sectional view of the device in a closed position, showing the internal components and the housing.